Amendment to the Claims

In the Claims:

Please cancel Claims 14-34, in response to a restriction requirement.

Please amend Claims 1 and 5 as follows:

1. (Currently Amended) An automated reaction system for continuously performing a plurality of optimization experiments to enable at least one optimal reaction parameter for a reaction to be identified, the reaction producing a desired product, comprising:

(a) a controller, said controller being configured to monitor and control the system while continuously performing a plurality of optimization experiments, such that during each of the plurality of optimization experiments, at least one of a plurality of reaction parameters controlled by the controller is changed according to a predefined protocol, the plurality of reaction parameters including at least the parameters of temperature and reactant concentration, the plurality of optimization experiments enabling optimal reaction parameters to be identified;

(b) a reactant supply source for each reactant required for the reaction;

(c) a solvent supply source coupled in fluid communication with each reactant supply source;

(d) a dilution pump for each reactant, each dilution pump being coupled in fluid communication with a corresponding reactant supply source and with the solvent supply source for a corresponding reactant, and being logically coupled to the controller and operative to vary a concentration of a corresponding reactant using a solvent;

(e) a reaction module having an inlet coupled in fluid communication with each reactant supply source and the solvent supply source to receive each reactant, and an outlet, the reaction module being operative to initiate the reaction of the reactants; and

(f) at least one analytical unit coupled in fluid communication with the outlet and logically coupled with the controller, the analytical unit being configured to analyze the desired product, producing data for the plurality of optimization experiments used to determine at least one optimal reaction parameter.

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2. (Original) The automated reaction system of Claim 1, further comprising a reactant pump for each reactant required for the reaction, each reactant pump being logically coupled to the controller and operative to provide a flow of a corresponding reactant to the inlet of the reaction module.

3. (Original) The automated reaction system of Claim 1, further comprising at a plurality of residence time chambers, each resident time chamber being configured to be coupled in fluid communication between the outlet of the reaction module and the analytical unit.

4. (Original) The automated reaction system of Claim 3, wherein the controller carries out a plurality of functions, including:

(a) directing a flow of fluid from the outlet of the reaction module sequentially into each of the plurality of residence time chambers;

(b) directing a flow of fluid from the outlet of a last of the plurality of residence time chambers, which is last to sequentially receive the flow of fluid from the outlet, into the analytical unit;

(c) obtaining data from the analytical unit for a fluid exiting the last residence time chamber; and

(d) after data have been obtained from the analytical unit for the fluid exiting the last of the plurality of residence time chambers, carrying out a further plurality of functions, including:

(i) isolating the last of the plurality of residence time chambers from the analytical unit;

(ii) directing a flow of fluid from the outlet of a preceding residence time chamber into the analytical unit; and

(iii) obtaining data from the analytical unit for a fluid exiting the preceding residence time chamber.

5. (Currently Amended) The automated reaction system of ~~Claim 4, wherein the plurality of functions carried out by the controller include directing a flow of fluid from the outlet of the reaction module into the analytical unit, such that such that data corresponding to the flow of fluid from the outlet of the reaction module is collected~~ Claim 1, wherein the predefined protocol comprises at least one of:

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(a) implementing a plurality of optimization experiments in which each reaction parameter has been predefined;

(b) implementing a plurality of optimization experiments in which each reaction parameter is varied between a predefined maximum value and a predefined minimum value based on a predefined function; and

(c) implementing a plurality of optimization experiments in which each reaction parameter in an initial set of optimization experiments is predefined, and in which at least one reaction parameter in a later set of optimization experiments is determined based on results from the initial set of optimization experiments.

6. (Original) The automated reaction system of Claim 1, further comprising a heat exchanger configured to thermally condition each reactant entering the reaction module, the heat exchanger being logically coupled to and controlled by the controller.

7. (Original) The automated reaction system of Claim 6, wherein the controller controls a flow of a temperature conditioned fluid through the heat exchanger to vary a thermal condition in the reaction module over time, such that the analytical unit collects data corresponding to a plurality of different thermal conditions in the reaction module, to determine an optimal thermal condition for the reaction.

8. (Original) The automated reaction system of Claim 1, wherein the controller controls each dilution pump to vary a concentration of each reactant over time, such that the analytical unit collects data corresponding to a plurality of concentrations of each reactant, to enable an optimal concentration of each reactant to be identified for the reaction.

9. (Original) The automated reaction system of Claim 1, wherein the controller controls a plurality of reaction parameters according to a periodic pattern, such that the analytical unit collects data corresponding to a plurality of values for each reaction parameter, to determine an optimal value for each reactant parameter.

10. (Original) The automated reaction system of Claim 9, wherein the controller varies the predefined pattern based on the data produced by the analytical unit.

11. (Original) The automated reaction system of Claim 9, wherein the controller simultaneously varies at least two reaction parameters based on a periodic function.

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12. (Original) The automated reaction system of Claim 11, wherein each of the at least two reaction parameters are varied by the controller according to different periodic functions.

13. (Original) The automated reaction system of Claim 12, wherein the controller further:

(a) evaluates the data produced by the analytical unit after each of the at least two reaction parameters are varied according to their respective periodic functions;

(b) identifies new upper and lower boundaries for at least one of the at least two reaction parameters;

(c) based on the new upper and lower boundaries, redefines at least one periodic function; and

(d) simultaneously varies each of the at least two reaction parameters based on the periodic functions, using each that has been redefined.

Claims 14-34 (Cancelled)

Please add new Claims 35-38 as follows:

35. (New) The automated reaction system of Claim 1, wherein the controller implements the following functions:

(a) uses a baseline value for each reaction parameter to generate the desired product;

(b) determines at least one of a quantity and a quality of the desired product generated using the baseline values;

(c) changes the baseline value for at least one reaction parameter, thereby affecting the desired product being produced by the automated system; and

(d) determines at least one of a quantity and a quality of the desired product generated using the at least one baseline value that was changed.

36. (New) The automated reaction system of Claim 1, wherein the controller implements the following functions:

(a) uses a baseline value for each reaction parameter to generate the desired product;

(b) determines at least one of a quantity and a quality of the desired product generated using the baseline values;

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(c) changes the baseline value for at least one reaction parameter according to a linear function, thereby affecting the desired product being produced by the automated system; and

(d) determines at least one of a quantity and a quality of the desired product generated using the at least one baseline value that was changed, such that if data corresponding to at least one of a quantity and a quality of the desired product generated using the at least one baseline value that was changed is indicative of a linear discontinuity, then for each value corresponding to a linear discontinuity, defining that value as a baseline value and repeating functions (a) - (d).

37. (New) An automated reaction system for continuously performing a plurality of optimization experiments to enable at least one optimal reaction parameter for a reaction to be identified, the reaction producing a desired product using at least two reactants, comprising:

(a) a controller, said controller being configured to monitor and control the system while performing optimization experiments;

(b) a reactant supply source for each reactant required for the reaction;

(c) a solvent supply source coupled in fluid communication with each reactant supply source;

(d) a dilution pump for each reactant, each dilution pump being coupled in fluid communication with a corresponding reactant supply source and with the solvent supply source for a corresponding reactant, and being logically coupled to the controller and operative to vary a concentration of a corresponding reactant using a solvent, such that the concentration of each reactant can be varied independently of the concentration of each other reactant;

(e) a reaction module having an inlet coupled in fluid communication with each reactant supply source and the solvent supply source to receive each reactant, and an outlet, the reaction module being operative to initiate the reaction of the reactants; and

(f) at least one analytical unit coupled in fluid communication with the outlet and logically coupled with the controller, the analytical unit being configured to analyze the desired product, producing data for the plurality of optimization experiments used to determine at least one optimal reaction parameter.

38. (New) A method for using a continuously running system to determine at least one optimal reaction parameter for a reaction to produce a desired product, comprising the steps of:

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(a) identifying a plurality of reaction parameters to be varied, at least one reaction parameter comprising a concentration of a reactant utilized to obtain the desired product;

(b) for each reaction parameter, identifying a plurality of values to be assigned to the reaction parameter;

(c) selecting a baseline value for each of the reaction parameters from the plurality of values identified for each reaction parameter;

(d) using the baseline values to generate the desired product in a continuously running reaction system;

(e) determining at least one of a quantity and a quality of the desired product generated using the baseline values;

(f) changing the baseline value for at least one reaction parameter, thereby affecting the desired product being produced by the continuously running system, such that where the baseline value to be changed comprises a concentration of a reactant utilized to obtain the desired product, the baseline value is changed by utilizing a dilution pump to vary a concentration of that reactant by adding a solvent to the reactant;

(g) determining at least one of a quantity and a quality of the desired product generated using the at least one baseline value that was changed; and

(h) comparing the at least one of the quantity and the quality of the desired product generated before changing the at least one of the baseline value with a corresponding at least one of the quantity and the quality of the desired product generated after the step of changing, to determine the at least one reaction parameter responsible for generating the highest of at least one of the quantity and the quality of the desired product.

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